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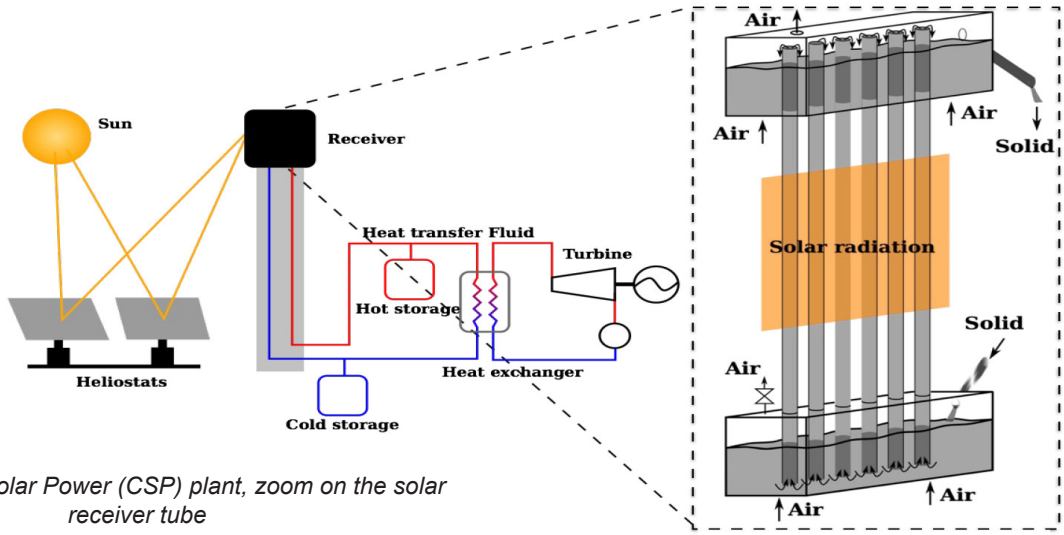
MODELING AND SIMULATION OF SOLAR RECEIVER WITH UPFLOW BUBBLING FLUIDIZED BED

Modélisation et simulation d'un récepteur solaire à lit fluidisé ascendant

The European next-CSP project addresses significant improvements to concentrated solar power, the proposed fluidized particle-in-tube concept is a breakthrough innovation that opens the route to the development of a new generation of CSP plants allowing high efficiency new cycles and improvement of plant efficiency.

During this PhD thesis, using NEPTUNE_CFD software, three-dimensional numerical simulations will be carried out via an Eulerian n-fluid approach by coupling hydrodynamics of the two-phase flow and heat transfer. First of all, numerical results for a lab-scale ($4MW_{el}$) set-up will be obtained and compared with the experimental measurements. These comparisons will allow evaluating and improving NEPTUNE_CFD mathematical models and particle numerical description to predict the suspension behavior in the solar receiver and to enhance the understanding of mechanisms involved. In a second part, simulations of particle flow in long receiver tubes at the industrial scale will be carried out. This numerical approach after validation of the model using experimental results will be helpfull for the design and the optimization of a multi-megawatt ($150MW_{th}$) particle solar receiver.



Concentrated Solar Power (CSP) plant, zoom on the solar receiver tube